



(11) Publication number: **0 454 458 A2**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number: 91303728.9

(51) Int. Cl.⁵: B41J 2/01, B41J 3/36

(22) Date of filing: 25.04.91

(30) Priority: 27.04.90 GB 9009531

(43) Date of publication of application:
30.10.91 Bulletin 91/44

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI NL SE

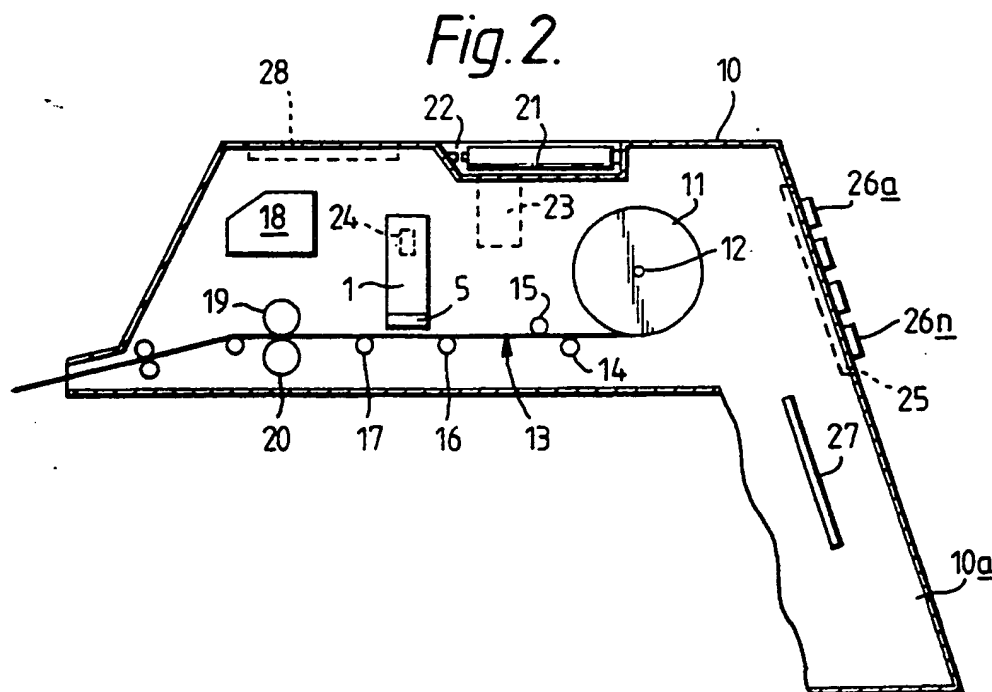
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(54) Improvements relating to label printing.

(57) A device suitable for printing bar codes is disclosed, this device comprising a housing, means for holding a label supply roll, printing means for applying indicia to a label, means for supplying data to determine the nature of the indicia printed on the label, and means for supplying electrical energy to operate the device, characterised in that said print unit comprises an ink jet print head actuated piezoelectrically.



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This invention relates to label printing and, more particularly but not exclusively, is concerned with the generation of indicia which constitute a bar code.

Bar codes are now widely used for ready identification of products at goods-in and check-out locations associated, for example, with retail trading. They facilitate the use of fully automatic in-and-out systems and, in some instances, do away with the need for price labels on the products. Many supermarkets stock 25,000 to 30,000 items for sale, however, and do not have sufficient shelf space to allocate all of these items to a particular position; as a result, even if there is a bar code on such products, there is still a need for price marking. Nevertheless, the use of a bar code scanning system to identify the goods may reduce labour requirements significantly and thus produce considerable savings.

In supermarkets, typically 95 - 96% of food items going through the check-out have a bar code already printed at source by the manufacturer. For non-food items, the number of products bar coded at source is typically 80 - 85% of those going through the check-out.

In order to apply price labels to items already carrying a bar code, and to add a bar code to those products which are not coded at source, it is common for a retail outlet to use one or more label printers. These may be hand-held or fixed in position. Typically, three stationary printers may be used by up to ten people. Strips of labels will be printed and taken to the product and either applied by hand or with a dispenser. Some retailers consider that it is more economical for each operative to have his own hand-held bar code label printer.

If a national bar code has been allocated to a given product, this will normally be used by the retailer if no manufacturer's bar code is present. For products where no such national bar code has been allocated, it is up to the retailer to decide on his own bar code number. Typically, this number might be based on the numbering system used by the retailer before the introduction of bar code scanning to his store. In practice, the person generating bar codes with a printer will have with him source material which indicates the nature of the bar code for each product where a label is required.

Hand-held labelling machines typically comprise a housing which is arranged to store a label supply roll; a printing unit; and a keyboard for inputting data. When such a machine is used to print bar code labels, an operative will input the bar code number via the keyboard, which then activates a label feed mechanism and the printing unit to apply the requested bar code to one of the labels on the supply roll. After the bar code has been printed, the label feed mechanism moves the supply roll so that the printed label is accessible for application to the appropriate goods item.

The printing unit in a typical bar code printer or labelling machine is based on a thermographic printing head. This is conventionally used in conjunction with thermographic paper. This need for a special quality of paper in conjunction with the high peak currents needed to heat the image elements of the thermographic print head tend to limit the versatility of bar code printers and to limit the operating time where the power supply for the printer is an internal battery.

If the high peak currents required by, for example, current solid state thermographic printing heads can be avoided, it may also be possible to simplify the electrical circuitry associated with the printer since there will be less need to take into account hysteresis effects (temperature against time) resulting from sequential use of the same dot matrix element on the print head.

There is therefore a need for a bar code printer/labeller which overcomes or ameliorates the above disadvantages.

According to the present invention, there is provided a label printing device suitable for printing bar codes, which comprises a housing, means for holding a label supply roll, printing means for applying indicia to a label, means for supplying data to determine the nature of the indicia printed on the label, and means for supplying electrical energy to operate the device, characterised in that said printing means comprises an ink jet print head actuated piezoelectrically, preferably by means of at least one piezoceramic actuator. A print head of this kind supplies ink droplets on demand.

A label printing device in accordance with this invention may be fabricated as a portable unit, preferably sufficiently small to be hand-held.

Plain paper labels may be used with such an ink jet, and the consumption of ink is low since none is wasted during the printing operation.

Preferably, the print head comprises a plurality of closely spaced ink channels connected to a supply of ink. The walls of the channels are preferably the piezoelectrically active components which generate a force, on demand, resulting in the expulsion of ink from one or from a predetermined number of the channels.

A stationary print head is preferably used in a printer of the present invention. Such a print head needs to be as wide as the desired printing width; simplicity is achieved by dispensing with a shuttle mechanism (such as is used with most commercially available ink jet printers) for moving the print head relative to the substrate.

A print head for use in a printer of this invention may be fabricated by forming a plurality of closely spaced grooves or channels in a piezoceramic base block. Electrodes may then be deposited, with appropriate connections, preferably in the side walls of the channels. A drive chip may then be added, after

which a second piezoceramic layer, also grooved and provided with electrodes as just described, is fitted as a capping layer to define in cooperation with the base layer a plurality of ink channels. A nozzle plate may then be fitted over the end of the ink channels.

The invention is illustrated, by way of example, in the accompanying drawings, in which:

Figure 1 shows, schematically, an ink jet print head for use in this invention; and

Figure 2 shows a schematic view of a hand-held label printer incorporating an ink jet print head as shown in Figure 1.

Referring now to Figure 1, the print label comprises a top piezoceramic member 1 which co-operates with a bottom piezoceramic member 2 to define between them a plurality of ink channels 3a.....3n. Wall electrodes 4 are provided on both lateral walls of each ink channel. A nozzle plate 5 forms one end of the print head and includes a plurality of nozzle outlets 6a.....6n each of which communicates with a corresponding ink channel 3a.....3n.

As shown in Figure 2, the ink jet print head (referred to as 1 in Figure 2, for convenience) is supported in a stationary location within a housing 10. A label supply roll 11 is supported on spindle 12, and pays out a supply of labels 13 which pass over rollers 14, 15, 16 and 17. The nozzle plate 5 of print head 1 is positioned in close proximity to the label path in the region between rollers 16 and 17.

A stepping motor 18 drives a roller 19 which co-operates with slave roller 20 to define a nip through which the label web passes. Power for motor 18 is provided by electrical batteries 21 housed in a compartment 22 accessible from the top surface of housing 10. Also accessible via compartment 22 is a replaceable ink supply unit 23.

Print head 1 contains a control element 24 which is conventional in nature.

Data relating to the indicia to be printed onto one of the labels can be inputted via a keypad 25 which comprises alphanumeric key elements 26a26n. Overall printing control is maintained through a microprocessor 27 located inside handle 10a of housing 10. Connections between the data input means 25 and the microprocessor 27, and between the latter and the control unit 24 of print head 1 and the stepping motor 18, are omitted for reasons of clarity.

A display panel 28 is provided on the top surface of housing 10 and includes, typically, a multi-element LCD. Again, the connections between display 28 and microprocessor 27 are omitted.

The print head 1 is arranged to print indicia over the full width of the label web 13.

codes, which comprises a housing, means for holding a label supply roll, printing means for applying indicia to a label, means for supplying data to determine the nature of the indicia printed on the label, and means for supplying electrical energy to operate the device, characterised in that said print unit is comprises an ink jet print head actuated piezoelectrically.

2. A device as claimed in claim 1, further characterised in that the ink jet print head is actuated by at least one piezoceramic actuator.

3. A device as claimed in claim 1 or 2, further characterised in that the ink jet print head is a stationary print head arranged to generate indicia over the desired printing width.

4. A device as claimed in claim 1, 2 or 3, wherein said print head comprises an array of ink channels in contact with an ink source.

5. A device as claimed in claims 2 and 4, characterised in that electrodes are deposited on the side walls of said ink channels.

6. A device as claimed in any preceding claim, which is the form of a hand-held unit.

Claims

1. A label printing device, suitable for printing bar

Fig. 1.

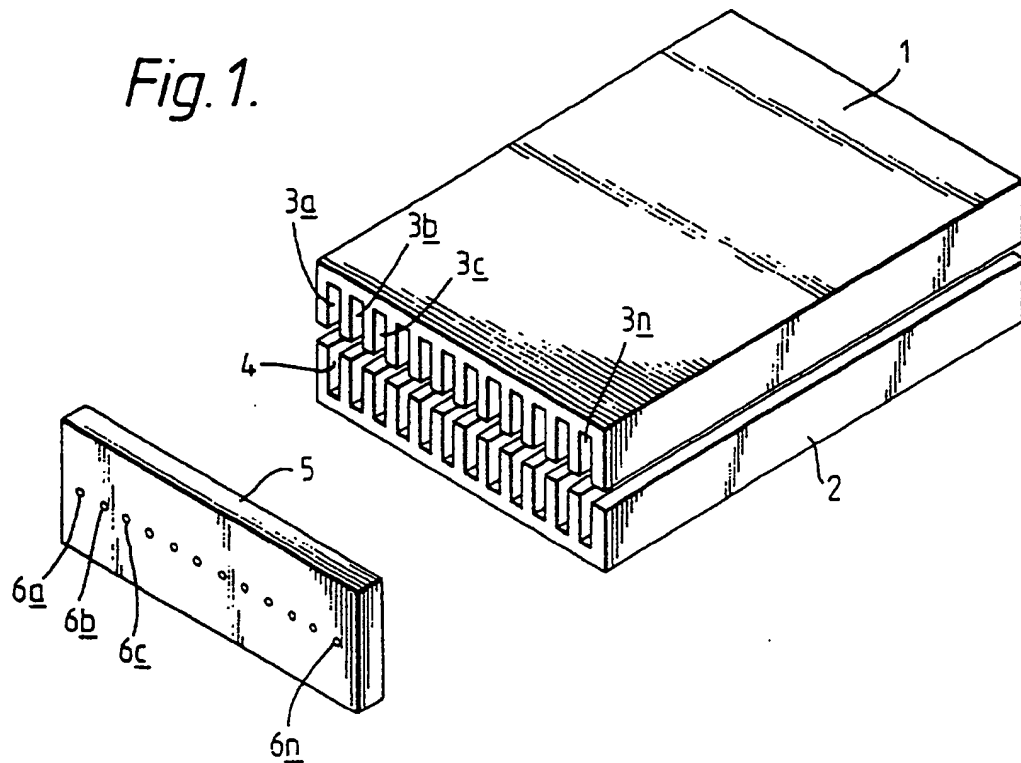


Fig. 2.

